AMENDMENTS TO THE DRAWINGS

The attached sheet of drawing includes changes to Fig. 31B. This sheet of drawing, replaces the original sheet of drawing of Fig. 31B. In Fig. 31B, the label of the arrow pointing to layer 118 is changed from "G" to "R" and the arrow pointing to magenta filter 152 is changed from "R" to "G".

REMARKS/ARGUMENTS

STATUS OF CLAIMS

In response to the Office Action dated February 22, 2008, claims 1, 2 and 9 have been amended, and claim 20-28 has been added. Claims 1, 2, 6, 8-12, 14, 16, 17 and 19-28 are now pending in this application. No new matter has been added.

DRAWING CORRECTION

The Examiner has objected to the drawings for having minor informalities. In particular, the Examiner notes that in Fig. 31B, the arrows designating colors and pointing to layer 118 and magenta filter 152 designate the wrong colors.

By this response, a replacement sheet of drawing has been submitted for Fig. 31B. In Fig. 31B, the label of the arrow pointing to layer 118 is changed from "G" to "R" and the arrow pointing to magenta filter 152 is changed from "R" to "G".

CLAIM OBJETIONS

Claims 1, 2, 6, 8-12, 14, 16, 17 and 19 have been objected to for having minor informalities.

By this response, claims 1 and 9 have been amended as suggested by the Examiner. Therefore, withdrawal of this objection to claims 1, 2, 6, 8-12, 14, 16, 17 and 19 is respectfully solicited.

REJECTION OF CLAIMS UNDER 35 U.S.C. § 102 AND § 103

I. Claims 1, 2, 6, 10, 12, 14, 16, 17 and 19 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Tabei (U.S. Patent 4,514,755).

The rejection of claim 2 is respectfully traversed.

(a) Claim 2 delineates that:

> ***a color signal of one color*** being different from two colors of the three primary colors, the two colors being detected by a first light-receiving section with the complementary color filter stacked thereon, ***is determined by subjecting, to interpolation processing, at least one detection signal detected by at least one second light-receiving section*** which is provided around the first light-receiving section and, at least, detects the color signal of the one color being different from the two colors detected by the first light-receiving section. (Emphasis added)

In the Office Action, the Examiner maintains that this subject matter is disclosed in Tabei at column 11, lines 4-61. This portion of Tabei describes:

> In FIG. 7, the photoconductive sublayer of the photosensitive layer 104 detects and absorbs blue and green light. However, that portion of the photosensitive layer 104 which is covered by the monocolor filter 105 will not be able to detect and absorb both blue and green light if the filter is designed to discriminate between these colors. That portion of photosensitive layer 104 which is not covered by the monocolor filter 105 will, however, be capable of absorbing and detecting both blue and green light. The photoconductive sublayer of the photosensitive sublayer 103 detects and absorbs red light, so that as light in the wavelength region of red light strikes the layer 103 the resistance of the photoconductive sublayer is reduced. Therefore, in much the same manner as has already been described, the elements 106, 109 and 110 form a pixel set and are able to detect three colors.
>
> FIGS. 11(a) and 11(b) illustrate two different ways of detecting all three colors with the embodiment of FIG. 7. In FIG. 11(a), the monocolor filter 105 is a yellow filter so that the portion of the sublayer 104 underlying the monocolor filter will detect green light. The three signals R, B+G and G will permit all colors to be detected. In FIG. 11(b), a magenta filter is used, and the portion of the sublayer 104 underlying the monocolor filter 105 will therefore detect blue light. The three signals R,

B+G and B can similarly be combined to detect all three color components.

Instead of arranging the layers as shown in FIG. 7, the construction of FIG. 9 may be employed wherein the upper layer 104 is sensitive to only blue light and the lower layer 103 is sensitive to both green and red light. In this case, the monocolor filter 105 could be either magenta or cyan. As shown in FIG. 11(c), a magenta filter will result in three color signals B, G+R and R which can be combined to determine all colors. As shown in FIG. 11(d), a cyan filter results in signals B, G+R and G which can also be combined to determine all colors.

While the construction of FIG. 6 is particularly suitable for use with the switching elements of the European Pat. No. 0046396 and the Japanese Patent Application No. 56-133880, which will not permit the use of photosensitive diodes 5 and 5' in the layer 102, it should of course be appreciated that it could also be used with the switching elements disclosed in British Pat. No. 2,029,642. FIG. 8 shows such an arrangement. The embodiment of FIG. 8 is similar to that of FIG. 7 except that the electrodes sublayers are connected to the sources or drains of the switching elements. The operation of the embodiment of FIG. 8 will be illustrated in FIGS. 11(a) or 11(b) depending on the color of the monocolor 105. FIG. 10 is an alternative arrangement which differs from FIG. 8 only in that the layer 104 is sensitive to blue light while the layer 103 is sensitive to both green and red light. This embodiment will operate as illustrated in FIGS. 11(c) or 11(d), depending on the color of the monocolor filter 105.

Clearly, there is no description in this portion of Tabei of anything regarding performing interpolation processing, let alone that a color signal of one color (that is different from two colors of the three primary colors) is determined by subjecting, to interpolation processing, at least one detection signal detected by at least one second light-receiving section which is provided around the first light-receiving section. Therefore, claim 2 is patentable over Tabei.

To expedite prosecution, claim 2 has been amended to be in independent form including all the limitations of independent claim 1. Therefore, claim 2, as amended, is patentable over Tabei.

(b) Tabei discloses a multilayer type image sensor having a "photoconductive layer" formed on a silicon substrate in which a readout circuit is formed (column 9, lines 31-46), and having an enlarged light-receiving section to achieve improved sensitivity. On the other hand, the present invention has a light-sensitive photodiode formed in a silicon substrate itself. The readout circuit formed in the same plane makes the photodiode (light-receiving) section smaller than on a multilayer type image sensor. However, this problem has been overcome by an on-chip microlens.

The device of Tabei has a number of problems. Since its spectral sensitivity differs from one position to another on a two-dimensional plane, different sampling points are employed for different colors (R, C and B) (Figs. 7 to 11), and the area of the photoconductive layer (i.e. sensitivity ratio) differs from one color to another (low for B in Fig. 11a, low for C in Figs. 11b and 11c and low for R in Fig. 11d). Moreover, as the photoconductive layer is of the two-layer construction, R, G and B cannot be read out separately from one another. It is only by outside signal processing that primary colors signals R, C and B can be obtained (Figs. 11a and 11b show that B cannot be read out separately from C, and Figs. 11c and 11d show that R cannot be read out separately from C). Owing to the photodiode having spectral sensitivity varying along the depth of the silicon substrate and the complementary filter transmitting two of R, G and B, the present invention employs the same size of light-receiving section (microlens and photodiode) for all the colors to obtain the separate R, G and B signals directly and achieve a reduction of any false color or color ratio difference at the same sampling point for the two colors transmitted through the complementary filter.

To further expedite prosecution, independent claim 1 has been amended to delineate, *inter alia*:

> ***a plurality of*** complementary color filters, ***with one complementary color filter*** stacked on ***each of at least half*** of the plurality of light-receiving sections, each complementary color filter blocking incident light of one color of three primary colors, to thereby permit transmission of incident light of remaining two colors of the three primary colors...

Support for this subject matter is the fact that each of embodiments 1-9 (see Figs. 1, 2, 16, 23, 29, 30, 42, 45, 49) discloses at least half of each of the light-receiving sections has a complementary color filter stacked thereon. In this regard, it should be noted that the language in a claim does not have to be identical to language in the specification. ***In re Lukach***, 442 F.2d 967, 969, 169 USPQ 795 (CCPA 1971); ***In re Wertheim***, 541 F.2d 257, 262, 191 USPQ 90, 97 (CCPA 1976), appeal after remand 646 F2d 527, 209 USPQ 554 (CCPA 1981); ***Kennecott Corp. v. Kyocera International, Inc.*** 835 F.2d 1419, 1422, 5 USPQ2d 1194, 1197 (Fed. Cir. 1987), cert. denied, 486 U.S. 1008 (1988); ***Vas-Cath Inc. v. Mahurkar***, 935 F.2d 1555, 19 USPQ2d 1111 (Fed. Cir. 1991).

The requirement is that the claimed subject matter finds support in the originally filed specification. One complementary color filter stacked on each of at least half of the plurality of light-receiving sections finds support in the originally filed specification.

Tabei does not disclose or suggest that a yellow filter is stacked on each of at least half of the plurality of light-receiving sections (see Fig. 6 and elements 106-111, for example). Therefore, amended independent claim 1 and claims 6, 10, 12, 14, 16, 17 and 19 are patentable over Tabei.

II. Claims 8 and 9 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tabei in view of Merrill (U.S. Patent 7,132,724), relied upon by the Examiner as disclosing an electric charge path formed from a heavily-doped impurity region with the region extending continuously up to the surface of a semiconductor substrate.

Claims 8 and 9 depend directly or indirectly from amended independent claim 1 and Merrill does not remedy the above-noted deficiency of Tabei with respect to amended independent claim 1. Therefore, claims 8 and 9 are patentable over Tabei and Merrill.

III. Claim 11 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Tabei in view of Stavely (U.S. Patent 6,535,249), relied upon by the Examiner as disclosing a digital camera optical system which comprises microlens 468 that is mounted on an upper portion of electronic sensor 416 for gathering image light 422 and focuses it onto the smaller width 488 of the light sensitive region 454 via an opening of light shields 440, 446 (Fig. 8, col. 5, lines 40-65).

Claim 11 depends directly from amended independent claim 1 and Stavely does not remedy the above-noted deficiency of Tabei with respect to amended independent claim 1. Therefore, claim 11 is patentable over Tabei and Stavely.

CONCLUSION

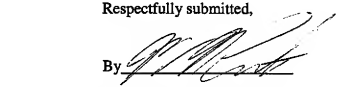
In view of the above, Applicant believes the pending application is in condition for allowance.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Edward J. Wise (Reg. No. 34,523) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§ 1.16 or 1.14; particularly, extension of time fees.

Date: **May 15, 2008**

Respectfully submitted,

By 

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